COMMENCEMENT
1991

UNIVERSITY OF CALIFORNIA
AT BERKELEY

PROGRAM

MASTER OF CEREMONIES.....Leon A. Henkin
Professor of Mathematics

BERNARD FRIEDMAN MEMORIAL PRIZE.....F. Alberto Grünbaum,
Chairman of the Department

CHARLES B. MORREY JR. AWARD.....Mrs. Charles B. Morrey Jr.

VALEDICTORY ADDRESS.....Lisa Ruth Hales,
Class of 1991

WILLIAM LOWELL PUTNAM COMPETITION HONORS .....Professor Henkin

PHI BETA KAPPA RECOGNITION.....Professor Henkin

MARK SWANSON PRIZE.....Ole Hansen Hald
Vice Chair for Undergraduate Affairs

PERCY LIONEL DAVIS AWARD .....Vaughan F. R. Jones
Professor of Mathematics

DOROTHEA KLUMPKE ROBERTS PRIZE.....Professor Jones

DEPARTMENTAL CITATION .....Professor Henkin

CERTIFICATE OF DISTINCTION .....Professor Henkin

OUTSTANDING GRADUATE STUDENT INSTRUCTOR CITATIONS .....Robion C. Kirby
Vice Chair for Graduate Affairs

NIKKI KOSE MEMORIAL TEACHING PRIZE.....Professor Kirby

DISTINGUISHED UNDERGRADUATE TEACHING AWARD ...Jeffrey Paul Esmond,
Mathematics Undergraduate Student Association

COMMENCEMENT ADDRESS .....Vaughan F. R. Jones,
Professor of Mathematics

PRESENTATION OF COMMENCEMENT SCROLLS .....Professor Henkin
& Vice Chair for Graduate Affairs William G. Bade

An informal reception will follow the ceremony.

CANDIDATES FOR THE A.B. DEGREE

IN MATHEMATICS

Mark Anderson Allen
Teresa S. Alvarez
Charles Edward Bartels
David Gordon Bernstein
Brian Joseph Birgen
Sarah Elizabeth Block
William Balko Branson
Roger Mark Breitenstein
Stanley S. Chang
Michelle Tze-Ching Cheung
Hsun-Ming Chou
Bryan Fredrick Clair
Keith Alan Clayton
Theodora Elena Danciu
Jessica Hope Dille
Peter Loren Engrav
Stephen Walter Erickson
María-Cristina Espinoza
Boris Fayn
Dennis Anthony Fong
Laurent Gambier
Lisa Agnes Gardner
Georg Kurt Gerber
Ching-Jung Guu
Christopher Mark Haight
Lisa Ruth Hales
Robert Douglass Hammie, Jr.
Paul Meredith Harb
Jennifer Lynn Henrikson
Michael Adam Hochster
Li-Wen Kathleen Kuo
Kathleen Marie Lallas
John V. Lampe
Jordan Lampe
David Lavi
Daniel Edward Leafe
Daniel Dean Leingang
Ofer Licht
Robert Liu
Marisha Erika Lockwood
Mari Katherine Lowes
David Imre Lukas
Michelle Ann Manes
Karen Christine McGrath
Matthew O'Rielly Morrison
Ashish Gopal Mukharji
Arvind N. Nair
Hiep Nguyen
Sebastian Nguyen
Miles Arthur Ohlrich
Marguerite Anita Oneto
Dubravka Jelena Opuhac
Jessica Panergo Page
Hong Joon Park
Cynthia Cathorn Pearl
John Robert Reed
Carlos C. Reyes
Gordon Ward Rogers
Rachel Diana Rose
Jonathan Conrad Ruyle
Michael Pugay Saclolo
Jennifer Akiko Saito
Roya Salehi
Nalini Nichola Sankar
Jason Auguste Schwartz
Steven Maxwell Seitz
Benjamin Robert Sklar
Richard McKee Smith
Mark Leslie Snyder
Sandhya Subramanian
Mohan P. Weerasinghe
Daniel Zvi Zanger

IN APPLIED MATHEMATICS

Joseph Anthony Abeyta
Nasir F. Ameireh
Eric Boncan Benitez
Judith Anne Brown
Al Cabrini
David Randolph Chan
Zwei-Tseng Chang
Ricky Chau
Chee-Kai Chin
Keicy Kyol Chung
Kamran Cochinwala
Mark Todd Coppejans
Katherine Marie Czukas
Rafe Robert Dimmitt
Jeffrey Paul Esmond
Jennifer Marie Espiritu
Scott Jason Gardner
David Allen Hildebrandt
Mark Andrew Hlavac
Eugene Andres Houseman
Vivienne H. Hsu
Michael Alexander Janson
Laurel Elizabeth Johnson
Brian Jeffrey Jue
Maria Spiros Kalofonos
Sung Phill Kang
Cho-Hee Kim
Bill Man Kong
Ravi Kundanmal
Philip Wing-Chi Lau
Lana Lee
Chienying Liu
Stanley Tzu-Chi Liu
Victor Liu
Ying-Suang Liu
Raymond K. Louie
David Russell Luke
Connie Siu-Ling Ma
Hector Paz Macias
Suzanne Carol Malitz
Michael Leonard Malloy
Stacy Lei Mizuguchi
Denise Nicola Moxy
Anh Trong Nguyen
William F. O'Connor
Michael Kevin Pierce
Robert Allen Ramsey
Michael Jeffrey Romain
Roberto Gomez Rosas
Paul Lee Samarel
Frank William Shermoen
Hwei-Lin Su
Rehan Mansoor Syed
Yasuko Takada
Brian Patrick Tandy
Henry Khatchatur Tatian
Cimaroon Donald Taylor
Tom Hung Teng
Vonetta Tilford
Duc Dinh Tran
Kim-Thoa Thi Truong
Anh Ngoc Vo
Dung Van Vo
Robert Michael Voith
Lauren Audrey Wang
David Edwin Wash
Hengky Atmadja Widjaja
Karl William Wieser
Steven Curtis Willett
Cynthia Wong
Kevin Yen
Kathleen Midori Yokoyama
Peter Kwong-Yui Yu

CANDIDATES FOR THE M.A. DEGREE

FALL 1990:

Teresa Hiu-Hung Chu

Karl Alan Dahlke

Donald Andrew Hayes

Frederic Mitchell Katz

Richard Betts Kraft

Ruth Ingrid Michler

John Joseph Morgan

Adam Harry Scarr

Derrick R. Smith

SPRING 1991:

David Paul Badal

Suzan Carlston

Clark William Ingham

Katie Margaret Jurney

Kyuduk Rhee

Dara Lynn Sandow

Jonathan Shlomo Shapiro

PH.D. DEGREE CANDIDATES

IN APPLIED MATHEMATICS

FALL 1990:

Leon A. Shirman: *CONSTRUCTION OF SMOOTH CURVES AND SURFACES FROM POLYHEDRAL MODELS*

SPRING 1991:

Yin Sun Feng: *STABILITY ANALYSIS OF SOME ROOT-FREE QR ALGORITHMS FOR SYMMETRIC TRIDIAGONAL MATRICES*

Zhu-shiu Liu: *ON THE EXTENDED HR ALGORITHM*

Zhong Ci Lou: *VORTEX APPROXIMATIONS OF THE NAVIER-STOKES EQUATIONS IN A BOUNDARY LAYER*

IN MATHEMATICS

FALL 1990:

Alton Raymond Brown: *AN ANALYTICAL TEST FOR CHAOS*

William Cooper Calhoun: *THE LATTICE OF IDEALS OF RECURSIVELY ENUMERABLE DEGREES*

Zachary Martin Franco: *DIOPHANTINE APPROXIMATION AND THE qx+1 PROBLEM*

Dmitry M. Gokhman: *COMPLEX HARDY FIELDS*

Maria del Rosario Gonzalez-Dorrego: *CURVES ON KUMMER SURFACES IN* p^3

Iwona Maria Grzegorczyk: *VECTOR BUNDLES ON ALGEBRAIC CURVES*

John Todd Hammond: *THE LATTICE OF SETS RECURSIVELY ENUMERABLE IN AN ORACLE*

Patrick Dennis McSwiggen: *INVARIANT MANIFOLDS AND INFINITESIMAL FOLIATIONS*

SPRING 1991:

William Erik Baxter: *CHROMATIC FRAMED LINK INVARIANTS AND CABLING*

Kai Achim Behrend: *THE LEFSCHETZ TRACE FORMULA FOR THE MODULI STACK IN PRINCIPAL BUNDLES*

David Patrick Bernier: *QUASICENTRAL APPROXIMATE UNITS RELATIVE TO NORMED IDEALS FOR THE DISCRETE HEISENBERG GROUP*

Maria Luisa Bonet: *THE LENGTHS OF PROPOSITIONAL PROOFS AND THE DEDUCTION RULE*

Gil Bor: *NON SELF-DUAL YANG-MILLS FIELDS*

David Layne Chopp: *COMPUTING MINIMAL SURFACES VIA LEVEL SET CURVATURE FLOW*

Mladen Despic: *AUTOMORPHISMS OF RADICAL CONVOLUTION ALGEBRAS*

Martin Robert Goldstern: *SETS OF REALS AND COUNTABLE SUPPORT ITERATION*

Jesus Gonzalo: *LARGE SOAP BUBBLES AND ISOPERIMETRIC REGIONS IN THE PRODUCT OF EUCLIDEAN SPACE WITH A CLOSED MANIFOLD*

Tom Ilmanen: *MOTION OF LEVEL SETS AND OF VARIAFOLDS BY MEAN CURVATURE*

Joohee Jeong: *ON FINITELY DECIDABLE VARIETIES*

Joanna Kania-Bartoszynska: *EXAMPLES OF DIFFERENT 3-MANIFOLDS WITH THE SAME INVARIANTS OF WITTEN AND RESHETIKHIN-TURAEV*

Gregory John Kuperberg: *INVARIANTS OF LINKS AND 3-MANIFOLDS VIA MULTILINEAR ALGEBRA AND HOPF ALGEBRAS*

Yingchen Li: *PICARD BUNDLES AND THE BRILL-NOETHER PROBLEM OF HIGHER RANK*

Helene Judith Nussenzveig Lopes: *AN ESTIMATE ON THE HAUSDORFF DIMENSION OF A CONCENTRATION SET FOR THE INCOMPRESSIBLE 2-D EULER EQUATION*

Robert Lum: *PIECEWISE AFFINE DYNAMICS*

Jonathan Paul McCammond: *THE WORD PROBLEM FOR BURNSIDE SEMIGROUPS: A POSITIVE SOLUTION FOR $a \geq 6$*

Loki Natarajan: *UNITARY HIGHEST WEIGHT REPRESENTATIONS OF CERTAIN INFINITE-DIMENSIONAL LIE GROUPS AND LIE ALGEBRAS*

George William Patrick: *TWO AXIALLY SYMMETRIC COUPLED RIGID BODIES: RELATIVE EQUILIBRIA STABILITY, BIFURCATIONS, AND A MOMENTUM PRESERVING SYMPLECTIC INTEGRATOR*

Anmin Qi: *THREE DIMENSIONAL VORTEX METHODS FOR THE ANALYSIS OF WAVE PROPAGATION ON VORTEX FILAMENTS*

Yongbin Ruan: *GAUGE THEORY AND ITS APPLICATION TO RIEMANNIAN GEOMETRY*

Stephen French Sawin: *SUBFACTORS FROM QUANTUM GROUPS*

Laurence Britt Schweitzer: *REPRESENTAITONS OF DENSE SUBALGEBRAS OF C*-ALGEBRAS WITH APPLICATIONS TO SPECTRAL INVARIANCE*

Marc Shepard: *THE TOPOLOGY OF SHORTEST CURVES IN SURFACES*

Harvey Jess Stein: *SINGULAR MORPHISMS, SMOOTHNESS, AND LIFTING LEMMAS*

Tandy Jo Warnow: *COMBINATORIAL ALGORITHMS FOR CONSTRUCTING PHYLOGENETIC TREES*

Jian Li Yang: *ADJOINT SPECTRUM OF ANOSOV DIFFEOMORPHISMS*

IN LOGIC AND THE METHODOLOGY OF SCIENCE

Spring 1991:

Juan P. Bagaria: *DEFINABLE FORCING AND REGULARITY PROPERTIES OF PROJECTIVE SETS OF REALS*

HONORS AND PRIZES

WILLIAM LOWELL PUTNAM MATHEMATICAL COMPETITION HONORS

The fifty-first annual competition was held on December 1, 1990. Thirty students from Berkeley participated. Honorable Mention is awarded to the team from

The Department of Mathematics, University of California at Berkeley

for placing 6th-10th among the 289 institutions from the United States and Canada entering the competition. A certificate is awarded to each of the following members of the team:

Brian J. Birgen, Jordan Lampe, Thomas S. Lumley

The five highest ranking individuals are accorded the title "Putnam Fellow" and receive awards of $500. One of this year's Putnam Fellows is:

Jordan Lampe

Individual Honorable Mention for placing among the top 2 per cent of students competing is awarded to:

Bryan F. Clair

PHI BETA KAPPA RECOGNITION

Election to Phi Beta Kappa is based on outstanding scholarship in all academic subjects.

During 1990-91 this honor was bestowed on the following students in the Department of Mathematics:

Jonathan Miles Callet
Ching Hsueh Chao
Chee-Kai Chin
Peter Loren Engrav
Stephen Walter Erickson
Georg Kurt Gerber
Kenneth Alan Goldberg
Kevin L. Gong
Katharine Govea
Brian Jeffrey Jue
Jennifer Christine Lee
Hong Park
Marcia Constance Peck
Jennifer Akiko Saito
Jason Auguste Schwartz

In addition, the following graduating students were elected to Phi Beta Kappa in 1989-90:

Judith Anne Brown
Lisa Ruth Hales
Michael Adam Hochster
Rachel Diana Rose

MARK A. SWANSON PRIZE

The Computer and Telecommunications Services Department of the Pacific Gas and Electric Company established this prize as a memorial to Mark A. Swanson, who worked in that department prior to his tragic and untimely death in August 1990. Swanson majored in Mathematics and graduated from U.C. Berkeley in 1978. The prize is designed to assist continuing undergraduate student majors in Mathematics in completing their education at Berkeley.

The 1990-91 award of $1000 is given to:

James M. Selvidge

PERCY LIONEL DAVIS AWARD FOR EXCELLENCE IN SCHOLARSHIP IN MATHEMATICS

Established by the daughter of Percy Lionel Davis in honor of her father, who graduated in Engineering in 1913. A cash prize is awarded to a senior who has demonstrated excellent scholarship in mathematics.

The 1990-91 awards of $125 each are given to:

Brian Joseph Birgen
Daniel Zvi Zanger

DOROTHEA KLUMPKE ROBERTS PRIZE IN MATHEMATICS

Established by Mrs. Dorothea Klumpke Roberts, Astronomer, in honor of her parents and husband. A cash prize is awarded to a senior who has demonstrated truly exceptional scholarship in mathematics.

The 1990-91 prizes of $250 each are given to:

Stanley S. Chang
Lisa Ruth Hales

DEPARTMENTAL CITATION

This recognition is bestowed on the top mathematics scholar in the graduating class. The name of the citation winner is placed with those of earlier winners on the Departmental Citation Plaque.

The 1990-91 citation is given to:

Lisa Ruth Hales

UNIVERSITY OF CALIFORNIA AT BERKELEY CERTIFICATE OF DISTINCTION

The University awards five Certificates of Distinction each year to graduating students in recognition of outstanding achievements at Berkeley. This year, a certificate is awarded to:

Stanley S. Chang

BERNARD FRIEDMAN MEMORIAL PRIZE IN APPLIED MATHEMATICS

Established in 1966 as a memorial to Bernard Friedman, a distinguished applied mathematician and ninth Chairman of the Department of Mathematics. A cash prize is awarded to a graduate student who has demonstrated ability to do research in applied mathematics.

The 1990-91 prizes of $125 each are given to:

David Layne Chopp
and
Stephen C. Creagh

CHARLES B. MORREY JR. AWARD

Established in 1985 to honor the memory of Charles B. Morrey Jr., an outstanding analyst and sixth Chairman of the Department of Mathematics. A cash prize is awarded to a graduate student of promise to encourage pursuit of doctoral research.

The 1990-91 award of $600 is given to:

Stuart Gordon Cowan

OUTSTANDING GRADUATE STUDENT INSTRUCTOR CITATIONS

These citations are presented by the Committee on Teaching of the Berkeley Division of the Academic Senate to those Graduate Student Instructors who have demonstrated exceptional teaching ability.

The 1990-91 citations are given to:

Ricardo Cortez
Pinaki Das
Joel Hamkins
Craig Hildebrand
Katie Jurney
Juan Molina
Ya'acov Peterzil
Sudeshna Sengupta
Jian Li Yang
Paul Zeitz

NIKKI KOSE MEMORIAL TEACHING PRIZE

Established in 1981 as a memorial to Nariaki (Nikki) Kose, a graduate student from Japan who died in a mountaineering accident in the summer of 1980. A cash prize is awarded to a Graduate Student Instructor in Mathematics for truly exceptional teaching performance.

The 1990-91 prize of $100 is given to:

Maria Luisa Bonet

DISTINGUISHED UNDERGRADUATE TEACHING AWARD

Established in 1983 by the Mathematics Undergraduate Student Association (MUSA). It is presented by MUSA and the graduating class to the professor who, in the judgment of the students, contributed most greatly to their mathematical studies.

The 1990-91 award is given to:

Ole Hansen Hald

HONORS PROGRAM

The requirements for graduation in the **Honors Program** are:

1. A grade-point average of at least 3.3 in all courses undertaken in the University.

2. A grade-point average of at least 3.5 in upper division mathematics requirements for **Honors**, at least 3.690 for **High Honors**, and at least 3.843 for **Highest Honors**.

3. Completion of course H196 in which the student writes a Senior Thesis, or completion of two graduate courses with a grade of at least A- in each.

4. The recommendation of the Head Major Adviser.

The Department of Mathematics is pleased to recognize the following candidates for the Mathematics Honors Program.

Brian Joseph Birgen
Stanley S. Chang
Bryan Frederick Clair
Stephen Walter Erickson
Lisa Ruth Hales
Eugene Houseman
Brian Jeffrey Jue
Jordan Lampe
David Russell Luke
Daniel Zvi Zanger

ABOUT THE COMMENCEMENT SPEAKER

Vaughan F. R. Jones, Professor of Mathematics, was born in Gisborne, New Zealand, in 1952. He received the Docteur es Sciences degree from the Ecole de Mathématiques in Geneva, Switzerland, in 1979. He joined the faculty in 1985, after having taught at the University of California at Los Angeles, the University of Pennsylvania, and the Université de Geneve.

Jones was awarded the Fields Medal (the mathematician's equivalent to the Nobel Prize) in 1990. The Medal was conceived by John Charles Fields, a Canadian mathematician "in recognition of work already done and as an encouragement for further achievements on the part of the recipient".

Jones' most notable discovery (to date) came about in 1984, when he found a way to characterize knots by means of polynomials, now known as the Jones polynomials. Of interest not only to mathematicians specializing in knot theory, Jones polynomials are being used by biologists to decipher the knots and links characteristic of DNA. Physicists, too, have found that Jones' discovery makes important contributions to statistical mechanics and provides a vital tool for probing into the structure of quantum physics.

Jones has been a Alfred P. Sloan Fellow and a Guggenheim Fellow. He is a Fellow of the Royal Society, and has been an invited visitor to the Insitut des Hautes Etudes Scientifiques in Bures-sur-Yvette, France.

ACKNOWLEDGEMENTS

The Department thanks the Graduation Committee for its efforts in preparing the commencement ceremony:

Teresa Janus *Rita Torres-González*
Rondi Phillips *Janet Yonan*
Doris Smith, Committee Chair

The Department is also grateful to the
Mathematics Undergraduate Student Association
for their contributions to the festivities.

Special thanks are owed to Professor George Bergman for his advice and support in the preparation of this booklet.